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Federal Bureau of Investigation

FBI LABORATORY 2000

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The information contained in the
FBI Laboratory 2000
report may also be viewed online at
www.fbi.gov/hq/lab/labannual00.pdf

The FBI Laboratory will move to this new stand-alone facility on the campus of the FBI Academy in Quantico, Virginia. The 463,000-square-foot facility is scheduled to be completed and occupied in June 2002.

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Message From the FBI Laboratory Director

The FBI Laboratory's report for the year 2000 highlights several Laboratory initiatives and outlines a vision to guide our future efforts to provide the broadest range of scientific and technical services to the law enforcement community. As with any summary, however, this report merely hints at the Laboratory's full range of capabilities or the accomplishments of dedicated staff who rarely receive adequate recognition for their efforts.

Since the merger with the Information Resources Division's Engineering and Infrastructure Branch three years ago, the Laboratory organization has transformed while our staff has grown. Even before expanding the scope of our services to include investigative technology support for FBI field operations (e.g., electronic and physical surveillance, radio communications, audio and video analysis, and technical training), the Laboratory was implementing new forensic technology for nuclear and mitochondrial DNA analysis, computer-based digital evidence examinations, and firearms identification technology.

Last year, the Laboratory assumed the lead role in the FBI's implementation of the *Communications Assistance for Law Enforcement Act (CALEA)*. The *CALEA* program works with telecommunications carriers (both wireline and wireless) to ensure that they can fulfill statutory obligations to enable electronic surveillance by developing necessary equipment and software to work with rapidly changing communications technology.

Advanced technology has transformed several forensic disciplines. During the 1990s, the FBI Laboratory examined a large percentage of DNA cases nationwide because only a few state and local laboratories were operating DNA units. Then, we were training hundreds of state and local forensic scientists to conduct DNA analysis while helping to establish national standards by sponsoring the Technical Working Group on DNA Analysis Methods (TWGDAM). Now, most DNA laboratories are moving to third-generation techniques, for which the Laboratory sponsored collaborative research with state and local crime laboratories to set national testing standards. Then, a national DNA database comprising all states was only a distant possibility. Now, the Combined DNA Index System (CODIS) is a reality with hundreds of hits to its credit. As a result of these initiatives by the FBI Laboratory, more forensic laboratories can provide faster results on smaller biological specimens, and all can participate in CODIS. Through our sponsorship of nine Scientific Working Groups, the FBI is helping spread TWGDAM's success in developing consensus-based standards for other disciplines.

In 2000, Congress authorized the collection of DNA samples from persons convicted in federal and military

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courts of violent crimes including murder and sexual assault. In so doing, Congress expanded CODIS's coverage to include crimes on federal lands, military reservations, and the District of Columbia, allowing for a truly national DNA database of convicted offenders when combined with the 50 state laws already enacted. Congress also authorized the FBI to create the Missing Persons Mitochondrial DNA Database, which went online in February 2001. The database will assist law enforcement agencies in identifying missing or unidentified persons through analysis of mitochondrial DNA (mtDNA), which may often be recovered from human remains. Such mtDNA profiles can be matched against mtDNA profiles stored in the database for known relatives of missing persons. We hope this program will help identify some of the 150-200 children who are abducted each year by nonfamily members.

Assimilating the Engineering and Infrastructure Branch and the *CALEA* program into the Laboratory required several adjustments in our organizational structure. The Laboratory now comprises three branches (investigative technologies, forensic analysis, and operational support), with *CALEA* reporting to my office. Key aspects of our reorganization anticipate the relocation in 2002 of nearly 700 employees from the forensic examination units at Headquarters to a new FBI Laboratory building under construction at the FBI Academy, 40 miles south of Washington, DC, at Quantico, Virginia. This new facility will provide unsurpassed capabilities for forensic analysis and technical support for law enforcement nationwide.

The FBI Laboratory plays an active role in the Nation's response capability against weapons of mass destruction (WMD). Our training and procedures first emphasize public safety at the incident scene. After the scene is secured, safe operations by FBI personnel rely on the ability to detect and diagnose potential threatening materials. With our flyaway laboratory, developed in collaboration with the U.S. Army, we can collect and analyze contaminated evidence to determine its source and to support prosecution. Our WMD program works closely with its counterparts in the U.S. Departments of Defense, Energy, Agriculture, and Health and Human Services. Our expanding render-safe program complements the Department of Defense's capabilities by taking advantage of common training and equipment.

In an era of *Daubert* challenges to forensic science, the FBI Laboratory is working with the forensic community to bolster the scientific basis for expert testimony in disciplines that rely on the comparison of evidence such as fingerprints, firearms, questioned documents, and hair. In *United States v. Mitchell*, testimony by an FBI validation review team on fingerprint identification provided scientific grounds for the judge to rule favorably on the scientific basis for fingerprint analysis. The approach in *Mitchell* serves as a model for defending against *Daubert* attacks in other forensic disciplines. The Scientific Working Groups for each of these disciplines are conducting validation reviews in anticipation of possible future challenges.

The Laboratory has established several key objectives for the next five years. Beyond the need to maintain high-service levels during our transition to Quantico, the Laboratory will continue strengthening our technical staff, reduce turnaround time for evidence examination through increased automation, prepare for ASCLD/LAB re-accreditation, and expand our quality system to address the requirements established by the International Standards Organization. We will also expand capabilities to capture and analyze digital evidence and exploit the investigative possibilities of information technologies. In short, we will intensify our efforts to be the provider of choice for forensic services to the FBI and other law enforcement agencies.

Donald M. Kerr
Assistant Director
Laboratory Division
Federal Bureau of Investigation

Programs and Initiatives

Combined DNA Index System

The Combined DNA Index System (CODIS) blends forensic science and computer technology into an effective tool for linking and solving violent crimes. CODIS enables federal, state, and local crime laboratories to exchange and compare DNA profiles electronically, thereby linking serial violent crimes to each other and to known sex offenders.

CODIS began in 1990 as a pilot project serving 14 state and local laboratories. The *DNA Identification Act of 1994* formalized the FBI's authority to establish a National DNA Index System for law enforcement purposes. In October 1998, the National DNA Index System became operational. There are 45 states currently participating in CODIS.

The National DNA Index System is the highest level in the CODIS hierarchy and enables the laboratories participating in the CODIS program to exchange and compare DNA profiles on a national level. There are 34 states and the U.S. Army and FBI Laboratories participating in the National DNA Index System. The 16 states not participating in the program have passed convicted offender laws and are expected to become participants in the near future. To date, there are 441,181 offender profiles and 21,625 forensic profiles in the National DNA Index System. The system has provided investigative leads in more than 1,500 cases.

Accomplishments as of December 2000

Investigations Aided	1,818 in 27 states
Forensic Hits	492 in 25 states
Offender Hits	656 in 23 states
Number of CODIS Laboratories	123
Number of NDIS Laboratories	97

CODIS generates investigative leads in crimes where biological evidence is recovered from the crime scene using the following two indexes:

- The Forensic Index contains DNA profiles from crime scene evidence.

CODIS Success Stories

The Reno Police Department made an arrest on May 31, 2000, relating to the 23-year-old kidnapping and murder case of a little girl. The arrest was based on the first database hit in the Nevada State DNA database and was the culmination of extensive cooperation between local law enforcement and the FBI. On September 3, 1977, 6-year-old Lisa Marie Bonham was reported missing from Reno, Nevada, where she was visiting with family members. The next day, her clothing was discovered in a brown paper bag in a dumpster in Verdi, Nevada, a few miles from Reno. The clothing was submitted to the FBI Laboratory for examination, and semen stains with Type A Secretor status were identified on portions of the clothing. DNA analysis was conducted on the clothing, and a profile was developed. On May 25, 2000, the Washoe County Sheriff's Crime Laboratory, the location of the Nevada State DNA database (which uses CODIS software), matched the DNA from the victim's clothing with the known DNA of Stephen Robert Smith.

In February 2000, the National DNA Index System linked an unsolved rape and murder case from Des Moines, Iowa (analyzed by the FBI Laboratory), to a convicted offender sample at the Florida Department of Law Enforcement in Tallahassee. In 1995, an unidentified woman's body was found on an off-ramp along an interstate in Des Moines, Iowa. After identifying the victim, police began looking at truck drivers as suspects because of the location of the body. The Iowa Department of Public Safety sent biological evidence left at the crime scene to the Laboratory for DNA analysis. The Laboratory analyzed the evidence and developed a DNA profile of the perpetrator. The profile was uploaded into CODIS, where the National DNA Index System matched it to the Florida offender. At the time of the match, the offender was incarcerated in a Florida prison for a sexual assault conviction in early 1999. After identifying the offender, police discovered he had a commercial trucking license.

- The Convicted Offender Index contains DNA profiles of individuals convicted of felony sex offenses and other violent crimes.

The success of the CODIS program is measured by the crimes it helps solve. CODIS's primary metric, the Investigations Aided, is defined as a case that CODIS assisted through a hit (a match produced by CODIS that otherwise would not have been developed).

In September 2000, CODIS received the Information Resources Management Council's Award for outstanding achievement in inter-agency cooperation and performance. The award is one of only two awards sponsored by the U.S. government annually.

Federal Convicted Offender DNA Database

The *DNA Identification Act of 1994* authorized the FBI to establish a National DNA Index System, but it did not authorize the collection of DNA samples from federal offenders. The enactment of the *DNA Analysis Backlog Elimination Act of 2000* closes this final legislative loophole by authorizing the collection of DNA samples from federal offenders and entering the samples into the National DNA Index System. Federal offenders would include, for example, individuals convicted of rape and murder in national parks, military installations, and the District of Columbia. It is estimated that there are 26,000 federal offenders who will be covered by the legislation.

The Laboratory's Federal Convicted Offender DNA Database program will create DNA profiles for convicted federal offenders and register them in the Combined DNA Index System (CODIS). CODIS is based on software that enables federal, state, and local laboratories to store and compare DNA data profiles electronically—thereby linking serial crimes—and identify suspects by matching DNA profiles. CODIS is composed of two sets of DNA data. The first data set consists of DNA profiles obtained from crime scene evidence. The second data set contains DNA profiles from convicted offenders.

Blood samples from convicted federal offenders will be drawn by the Bureau of Prisons and the Administrative Office of U.S. Courts and forwarded to the DNA Analysis Unit II for analysis and uploading of the DNA profiles into the CODIS database.

Missing Person Mitochondrial DNA Database

The FBI received authority and funding from Congress in December 1999 to create the Missing Person Mitochondrial DNA Database. The Missing Person Mitochondrial DNA Database went online February 2001. The FBI's Critical Incident Response Group and the DNA Analysis Unit II have collaborated to identify missing persons or unidentified individuals through mitochondrial DNA (mtDNA) analysis. Mitochondrial DNA is maternally inherited and is less prone to degradation than DNA from the nucleus of the cell.

According to the Critical Incident Response Group's National Center for the Analysis of Violent Crime, annually 150 to 200 children are involved in long-term, nonfamilial abductions. Many of these missing children are never located. Additionally, each year the Laboratory receives requests to assist in the identification of human remains.

There are two components of the Missing Person Mitochondrial DNA Database. One component includes a database of the DNA profiles from the relatives of known missing individuals that can be queried with the DNA sequences from the remains of unknown individuals in order to make an identification. The second component of the database includes the DNA profiles from the remains of individuals who cannot be identified by fingerprint, dental, medical, or anthropological examinations.

The Laboratory DNA Analysis Unit II will determine the mtDNA profiles of discovered missing persons of unknown identity, unidentified human remains, and reference profiles of relatives of missing persons. In addition, the suitability for nuclear DNA analysis or DNA recovered from these remains will be determined.

The DNA profiles will be added to the Missing Person Mitochondrial DNA Database.

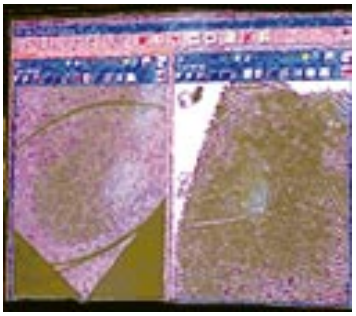
The Laboratory will provide a sample collection kit and guidance to field divisions for sample collection from relatives of missing persons.

Integrated Automated Fingerprint Identification System

On July 28, 1999, the Integrated Automated Fingerprint Identification System (IAFIS) became operational after a major developmental effort by the Criminal Justice Information Services (CJIS) Division with support from the Laboratory's Latent Print Unit. The primary purpose of IAFIS is to provide a national repository of criminals' fingerprints for maintaining a criminal history record for each arrested individual. The IAFIS repository contains approximately 40 million criminals' ten-print fingerprint records and provides an excellent source for searching unidentified latent fingerprints from unsolved crimes in an effort to identify perpetrators.

Since the inception of IAFIS, the Latent Print Unit has made positive identifications of 540 latent fingerprints with 441 individuals in 292 criminal investigations. Latent print identifications were made in a wide variety of criminal investigations including murder, rape, assault, domestic terrorism, weapons of mass destruction cases, extortion, racketeering, bank robbery, forgery, foreign police cooperation matters, and the identification of unknown deceased individuals. In some cases, IAFIS-aided latent print identifications have led to the identification of additional evidence, expanded the scope of investigations, or led to the opening of new cases.

This capability not only provides the FBI with a tremendous resource to solve crimes through the powerful evidence of a fingerprint identification with the perpetrator, but also enhances the state and local law enforcement agencies' abilities. The FBI continues to encourage federal, state, and local law enforcement agencies to electronically connect with IAFIS for the purpose of searching latent prints from their unsolved crimes. To date, the New York State Police, Texas Department of Public Safety, Wisconsin State Police, Illinois State Police, Mississippi Department of Public Safety, Florida Department of Law Enforcement, Boston Police Department, and the U.S. Army Crime Laboratory have established direct connections for latent print searching and have made identifications with individuals not in their state or local IAFIS repositories.



Computer screen showing an automated fingerprint comparison.

Additional IAFIS latent print capabilities continue to be developed that will further increase the FBI's ability to solve crimes:

- The Unsolved Latent File allows fingerprint specialists to register and store unidentified latent fingerprints that have been searched against the IAFIS criminal ten-print fingerprint file. If a ten-print fingerprint record is selected as a possible candidate with an Unsolved Latent File-registered latent fingerprint, IAFIS automatically notifies the fingerprint specialist, and a manual comparison is conducted between the two fingerprints to determine whether an identification has been made.

- Special Latent Cognizant Files are smaller ten-print fingerprint repositories that can support large, complex criminal investigations or investigations in which perpetrators fit a particular description or share a crime category. The criminal master file can be narrowed into a smaller database consisting only of individuals with similar characteristics, enabling focused searches with a better chance of making a hit.

Unsolved Latent File Identification

The Overland, Missouri, Police Department was investigating a counterfeit check ring operating in its city and in the surrounding counties. Suspects, using counterfeit alien registration cards as identification, were passing counterfeit checks, resulting in significant losses to businesses and financial institutions. Detectives seized a number of checks and registration cards and submitted them to the Laboratory Latent Print Unit for examination. The incoming communication noted that each check and registration card bore a recorded right thumbprint of the passer.

A Laboratory fingerprint specialist launched IAFIS searches of the recorded thumbprints and identified two individuals. The Overland Police Department was advised of their identity. The remaining unidentified thumbprints were placed in the IAFIS Unsolved Latent File.

In this case, an incoming ten-print fingerprint record submitted to CJIS hit against one of the thumbprints registered in the Unsolved Latent File. A manual comparison confirmed the identification, and the Overland Police Department was notified of the additional suspect. The ten-print fingerprint record that was matched against the Unsolved Latent File-registered thumbprint was collected following this individual's first arrest, which was for driving under intoxication. The investigation is ongoing.

Fingerprint *Daubert* Hearings

The first *Daubert* hearing on fingerprints was in an armed robbery case in Philadelphia, Pennsylvania, (*United States v. Mitchell*, 96-407-CR [E.D. Pa. Sept. 13, 1999]) that resulted in a favorable decision for the government. The judge not only denied the defense motion to exclude the fingerprint evidence, but also took judicial notice on two premises. The first was "that human friction ridges are unique and permanent throughout the area of friction ridge skin, including small friction ridge areas" and that "friction ridge arrangements are unique and permanent." The subsequent jury trial of Mitchell in 2000 resulted in a guilty verdict.

Since the *Mitchell–Daubert* hearing, there have been four motions that resulted in the judge hearing expert testimony in the form of a *Daubert* hearing prior to trial. Each judge ruled in favor of the government by denying the defense requests to exclude fingerprint evidence and testimony.

During 2000, there were five additional cases in which motions were filed on the basis of *Daubert* or *Frye*. The judge ruled on written or oral arguments by each attorney. No expert witnesses testified. In each case, the government cited prior court decisions. As a result, each judge ruled in favor of the government by denying the defense requests to exclude fingerprint evidence and testimony thereby eliminating the need for a *Daubert* hearing.

No evidence or testimony to date has been excluded in any case in which fingerprints have been challenged under *Daubert.*

Indian Country Evidence Task Force

On June 1, 2000, the Laboratory established the Indian Country Evidence Task Force, which is composed of Laboratory experts in the fields of DNA, firearms, latent prints, and trace evidence. In addition, all case-working units in the Laboratory have identified examiners to be responsible for Indian Country cases, although they are not full-time members of the Task Force. The Task Force provides dedicated service to Indian Country cases submitted by FBI field divisions and other contributors including the Bureau of Indian Affairs and addresses the need for timely support.

In the first seven months of operation, the Indian Country Evidence Task Force received more than 90 cases. Of the completed cases, 77 percent were reported out within 60 days.

Additional Indian Country Evidence Task Force services available to Indian Country field divisions include the following:

- Response by Task Force members with or without evidence response teams in extraordinary crime scenes at the request of a field division.
- Additional training to Indian Country field division personnel on collecting and preserving crime scene evidence.
- Reviewing evidence in any unsolved homicides.

To date, Indian Country Evidence Task Force members have assisted in teaching two basic crime scene courses targeting Indian Country FBI Special Agents and Bureau of Indian Affairs, Tribal Police, and local law enforcement agency personnel. A Task Force member also spoke at the National Native American Law Enforcement Association Conference at Las Vegas, Nevada, concerning basic crime scene investigation.

National Integrated Ballistics Information Network

The FBI and the Bureau of Alcohol, Tobacco and Firearms (ATF) merged their ballistics-imaging technology programs into a single, jointly managed program with a unified ballistics system, the National Integrated Ballistics Information Network (NIBIN). This merger was formalized by the signing of a memorandum of understanding before the Attorney General of the United States on December 2, 1999. The merger ensures the sharing of program responsibilities and leverages the strengths and resources of both agencies. ATF is responsible for crime gun operations including hardware, software, training, security, and database maintenance. FBI responsibilities include establishing a nationwide network based on a secure, high-speed communications vehicle and developing and deploying ancillary databases to support firearms examiners.

The unified NIBIN system is an enhancement of ATF's Integrated Ballistic Identification System (IBIS) and will combine the best features of IBIS and the FBI's DRUGFIRE. The ATF, in consultation with the FBI, will deploy the new unified system in a systematic manner, seeking to increase the number of hits while decreasing the cost per hit.

The overall direction and guidance of the joint NIBIN program are provided by the NIBIN Executive Board. The NIBIN Executive Board is composed of one member each from the FBI and ATF and one member representing NIBIN state and local users.

The NIBIN Executive Board's initial efforts focused on achieving interoperability between the two systems. It soon became apparent, however, that a single imaging technology would be a better solution because it would eliminate the need for an intermediate program with its inherent problems and limitations. Of most importance, a single unified system would facilitate future acquisition and optimal use of resources for taking ballistics-imaging technology to the next level.

DRUGFIRE will be incrementally phased out by the deployment of NIBIN. The FBI will maintain DRUGFIRE systems during the deployment, however. Significant cases in DRUGFIRE will be re-imaged into NIBIN.

The FBI and ATF will begin installing NIBIN in late fiscal year 2001. The conversion of all 151 NIBIN–DRUGFIRE sites and 72 NIBIN–IBIS sites should be completed by the end of fiscal year 2002.

National Laboratory Response Network for Bioterrorism

The National Laboratory Response Network for Bioterrorism is the result of an ongoing collaboration among the Centers for Disease Control and Prevention, the Association of Public Health Laboratories, the FBI Laboratory's Hazardous Materials Response Unit, and other federal agencies. The National Laboratory Response Network for Bioterrorism is composed of approximately 80 federal, state, and local laboratories. The network was developed to provide rapid analysis of evidentiary samples (both clinical and non-clinical) in actual and hoax uses of biological-threat agents.

The laboratory network will reduce the time required for analysis by eliminating transportation to specialty laboratories. This will facilitate a timely assessment of the need for treatment and/or decontamination of victims of bioterrorism and reduce the anxiety of victims of hoax threats.

In 2000, approximately $6.1 million was distributed to the states to maintain public health laboratory biological testing capacities. In addition, development of nine more standard operating procedures was initiated to isolate and identify select biological-threat agents.

Recently, the laboratory network received the 2001 Associations Advance America Award of Excellence sponsored by the American Society of Association Executives. The Award recognized the laboratory network as "an outstanding program which has resulted in significant benefit to American society." This Award automatically enters the laboratory network in the competition for the Summit Award, the highest level of recognition. The Summit Award will be announced during the summer of 2001.

Communications Assistance for Law Enforcement Act

In October 1994, Congress enacted the *Communications Assistance for Law Enforcement Act (CALEA)*. The law clarifies and further defines telecommunications carriers' statutory obligation to assist law enforcement in executing electronic surveillance. *CALEA* does not change or expand law enforcement's statutory authority to conduct electronic surveillance. It seeks to ensure that after law enforcement obtains the appropriate legal authority, telecommunications carriers will have the necessary technical capability and capacity to fulfill their statutory obligations to assist law enforcement by developing the necessary hardware and software to facilitate lawfully authorized electronic surveillance within a reasonable time and for a reasonable charge.

Effective June 12, 2000, the FBI's *CALEA* Implementation Section was transferred to the Laboratory. This transfer will facilitate the exchange of electronic surveillance information among the FBI, the law enforcement community, and the telecommunications industry. The FBI will coordinate issues related to law enforcement's needs, the industry's compliance with *CALEA,* and the Laboratory's Engineering Research Facility's efforts to stay abreast of solutions designed, developed, and deployed by the industry in furtherance of *CALEA*'s implementation.

The FBI has pursued nationwide right-to-use software licenses that allow telecommunications carriers to receive *CALEA*-compliant software at no charge on certain high-priority switching platforms. The FBI has also developed a flexible deployment initiative to minimize the costs and operational impact of the software installation. This strategy supports carriers' deployment of software solutions in accordance with their normal business cycles, whenever feasible.

The Laboratory will continue to do the following:

- Work with the industry as standards are developed for other telecommunications technologies to safeguard law enforcement's technical requirements,
- Enforce capacity requirements as prescribed by *CALEA*,
- Work with the Federal Communications Commission to ensure that all carriers have fulfilled their systems security and integrity obligations and confirm that any petitions filed by carriers do not adversely impact law enforcement efforts, and
- Ensure proper stewardship of appropriated funds.

DCS 1000

DCS 1000 is the code name for an unclassified law enforcement tool designed to intercept electronic communications (primarily Internet communications) under the requirements of current electronic surveillance laws. DCS 1000 can be connected to a digital network, such as the Internet, and intercept information destined to or originating from a specified user account or a computer named in an electronic surveillance order while ignoring all other data traversing the same network. It is designed to be used, in cooperation with a particular Internet service provider, on an as-needed basis to intercept only information that meets the strict criteria set out in a court order. DCS 1000 is a totally passive device—it does not transmit data onto a network and will not affect the performance of any network.

Historically, the FBI and other law enforcement agencies have developed new interception technologies to keep pace with the ever-changing telecommunications networks. As communications migrated to the Internet and other data networks, the law enforcement community was unable to identify commercial interception tools well-suited to support the narrowly defined requirements of lawfully authorized interceptions. The development of DCS 1000 was undertaken by the FBI's Engineering Research Facility in Quantico, Virginia, in response to this changing technology and requirements.

Although recent public discussions have focused on the ability of the government to use devices such as DCS 1000 to illegally abuse the privacy of citizens by intercepting and reading all e-mails, the FBI developed DCS 1000 specifically with these concerns in mind. Although there are many commercially available software programs that can intercept network communications, none have been identified that can do so in a way that protects the privacy of communications that are outside the scope of a particular court order. DCS 1000 is a tool dedicated to striking the necessary balance between the need for lawful interception of electronic communications and the privacy of the citizens. During the past nine months, FBI personnel have testified at two Congressional hearings and given Congressional and press briefings in an effort to inform the public about the ability of DCS 1000 to strike this balance.

The FBI supported a recent independent review of DCS 1000 by the Illinois Institute of Technology and the Chicago–Kent College of Law on behalf of the Department of Justice. The FBI is currently improving and developing DCS 1000 by implementing many of the recommendations of the review. A significant upgrade of DCS 1000, which will incorporate these changes, is anticipated in the coming months.

Justice Wireless Network

The FBI is required by Congress to convert the Land Mobile Radio System from a system that operates in a wideband mode to a narrowband mode by January 1, 2005. In order to meet this mandate, the FBI must replace all existing radios and the radio infrastructure (repeaters and base stations). All other Department of Justice (DOJ) agencies with radio systems are similarly affected and are working together to construct a single consolidated Land Mobile Radio System infrastructure, the Justice Wireless Network. Each agency will have the capability for agency–private communications but will also have interoperability with other agencies.

The FBI requires the following:

- A tactical Land Mobile Radio System with performance equal to or better than the current FBI system;
- A low probability of detection and interception solution for the national security mission; and
- Wireless connectivity to the publicly switched telephone network.

The new radio system will be implemented on a regional basis and will include input from the field division management and staff. Each Special Agent and funded task force member will be given a portable (hand-held) radio. Vehicles will be equipped with mobile radios or vehicle adapters, which will provide increased radio transmission range. Each field division will receive a onetime allowance per Special Agent and funded task force member to procure cellular telephones. In addition, an annual allotment per user will be provided to cover recurring service charges.

The new system will have digital voice clarity and will not suffer from range loss in the encrypted mode. Additionally, the system will be over-the-air rekeyed so that it is unnecessary to individually code the radios. It may also involve communication zones that will allow for centralized, after-hours radio-dispatch services. However, at a minimum, each FBI division will have its own separately controlled dispatch function.

Each office will receive a transportable capability (probably a trailer) to provide a temporary and/or supplemental Land Mobile Radio System infrastructure and can function as a portable interoperability solution allowing law enforcement agencies operating in different frequency bands to communicate in tactical or emergency situations without exchanging radios.

The new radio system will be supplemented by police band radios as well as satellite service in remote areas where commercial services and Land Mobile Radio coverage are not available.

The FBI will continue to maintain the existing radio system while the new Justice Wireless Network is installed.

Explosives Unit

The Materials and Devices Unit's name was changed to the Explosives Unit on January 10, 2000. At that time, the Unit also acquired the capability to conduct chemical analyses of explosives and accelerant residues previously done in the Chemistry Unit. The Explosives Unit has two areas of responsibility.

The first is the examination of evidence associated with bombing matters. The Unit conducts forensic examinations of improvised explosive devices, incendiary devices, and their remains and provides expert-witness testimony in court regarding the results of these examinations. Many of these examinations involve the identification and intended function of the components used in the construction of devices including detonators, wires, electronic components, initiators, tapes, timing mechanisms, explosives, containers, and power sources. Unit personnel provide field support in bombing matters, bombing crime scene investigations, and searches of bomb factories and safe houses in which bombs or bomb components may be encountered. Personnel maintain ongoing communications with national and international manufacturers of explosives and maintain the Explosives Reference File and the EXPERT databases, which are used to support forensic examinations. Explosives personnel also conduct training in bombing crime scene investigations for national and international law enforcement agency personnel.

The second major function of the Unit is the chemical analysis of materials to determine the type of explosive or accelerant used in an improvised explosive or incendiary device. This includes bulk substance analysis as well as the residue deposited after an explosive or incendiary ignites. Unit personnel have the ability to deploy explosives detectors to crime scenes and search locations. This capability enhances the Laboratory's ability to collect, preserve, and screen potential chemical evidence collected at major national and international terrorist events.

Forensic Audio, Video, and Image Analysis Unit

On February 13, 2000, the Forensic Photographic Examinations subunit of the Special Photographic Unit was merged with the Audio Video Media Analysis Unit. The new unit, the Forensic Audio, Video, and Image Analysis Unit, has the responsibility for conducting forensic examinations that include the following:

Audio

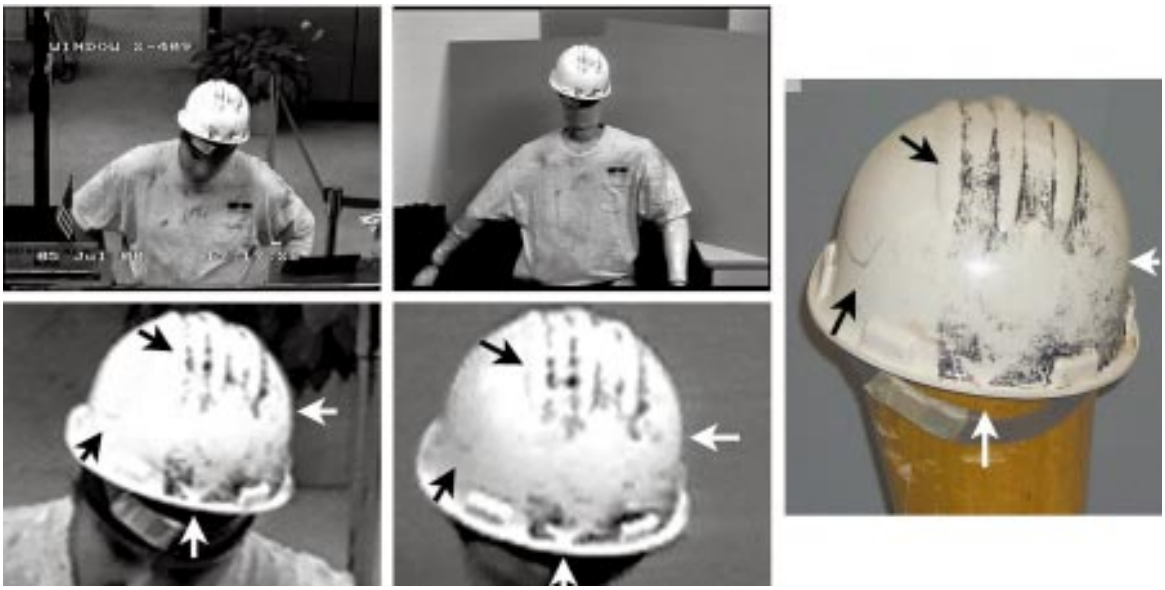
- Enhancement: Filtering noise to produce more intelligible audio recordings
- Voice comparison: Comparing recordings of questioned voices to known voice exemplars
- Signal analysis: Characterizing and identifying nonvoice recordings, such as gunshots and bomb blasts
- Authenticity: Determining if an audio/videotape is original, continuous, unaltered, and consistent with a particular tape recorder

Video

- Enhancement: Improving the image quality of a video recording and producing hard-copy images of the suspect and/or producing enhanced tapes
- Format conversion: Converting a video recording from one format to another
- Standards conversion: Converting a video recording from one standard to another, such as from PAL (Europe) to NTSC (United States)
- Damaged media repair: If damage is not too extensive, repairing, restoring, or retrieving recordings for playback and examination

Image

- Photogrammetry: Determining dimensions from questioned images (videos, films, photographs), such as a suspect's height, the length of a firearm, and the distance between vehicles
- Photographic comparison: Comparing the questioned image of an object to the actual item or the video image of a person to a known photograph, such as a mugshot, to determine whether they are identical or not
- Automobile make and model identification: Comparing questioned images of vehicles with the National Automotive Image File to determine the make and model
- Child pornography examinations: Comparing seized images of child pornography to images in the Child Exploitation and Obscenity Reference File to identify the original source of the images
- Image-manipulation detection: Examining questioned images to determine if they have been altered



Typical comparison technique for identifying suspected criminals from enhanced security camera videotapes: A video clip from a bank robbery (top left) is enlarged (bottom left) by FBI Laboratory video evidence examiners to compare with a videotape of identically positioned evidence (construction helmet, top and bottom center). The close-up photograph (right) of the evidence shows identifying characteristics such as ridges, scratches, and other markings.

Questioned Documents Unit

The Laboratory's Questioned Documents Unit personnel annually work approximately 2,500 cases involving thousands of specimens. The majority of the cases involve examinations of handwriting and/or hand printing and cover violations including fraud, bank robbery, kidnapping, racketeering, extortion, and espionage. The cases come from FBI and federal, state, and local investigations.

Generally, a handwriting examination is a side-by-side visual and microscopic comparison of two bodies of writing, questioned and known, to determine origin and/or authenticity. A handwriting examiner can provide only two conclusive opinions when reporting findings: identification or elimination. When a conclusive opinion cannot be reached, Unit personnel can provide two qualified opinions: may have prepared or may not have prepared.

As a result of recent *Daubert* court challenges to handwriting identification, Unit personnel assisted Alexandria, Virginia, U.S. Attorney's Office personnel in preparing a draft motion addressing these challenges. This document contains case cites regarding handwriting identification from each circuit court and is available on the Internet at **http://www.asqde.org/court.htm**

Accomplishments 1992–2000

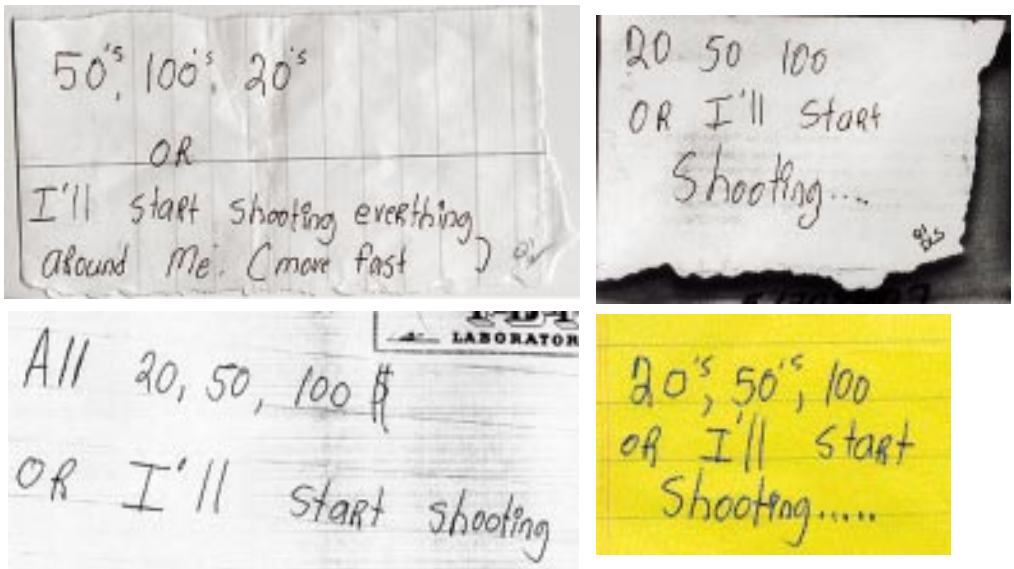
Bank Robbery Notes Submitted	6,582
Associations with Other Notes	3,130
Association Rate	48%

Bank Robbery Note File

The Bank Robbery Note File is a repository of images of notes used in national bank robberies. The majority of the notes are handwritten or hand printed and are associated by text. If an association is made, a comparison can be made between handwriting on the note searched and the handwriting in the case(s) identified by the search. In this way, a bank robber can be connected to multiple local or national bank robberies.

Handwriting Success Story

In April 2000, the Baltimore Division submitted a real estate fraud case to the Questioned Documents Unit for examination. The evidence consisted of more than 600 documents, including loan documentation, leases, bank statements, and payroll records. Approximately 50 documents bore signatures that were critical to the case. The signatures on these documents were compared with the known writing of the four subjects. Identifications were effected on 29 of these documents, and qualified opinions, leaning toward a subject in order to provide investigative assistance, were given for 19 of the documents. The evidence in this case was convincing. On September 12, 2000, two of the four subjects pleaded guilty to the charges of making false representations to a bank in order to obtain commercial property. These two subjects face up to 30 years imprisonment and a $1 million fine.



Handwriting associations collected in the FBI Laboratory's Bank Robbery Note File.

Handbook of Forensic Services

The *Handbook of Forensic Services* (formerly the *Handbook of Forensic Sciences*) has been rewritten. The purpose of the *Handbook* is to provide guidance and procedures for safe and efficient methods of collecting and preserving evidence and to describe the forensic examinations performed by the Laboratory.

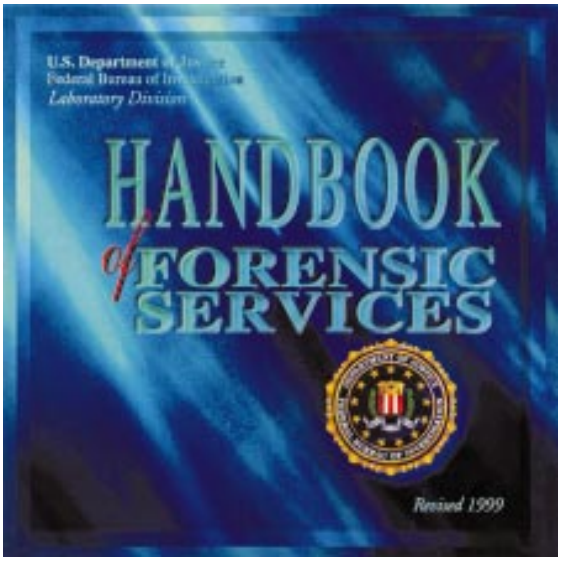
The *Handbook* is divided into five sections.

- **Introduction:** Details the availability of the Laboratory services, which include forensic examinations of evidence and expert-witness testimonies
- **Evidence Submission:** Lists the procedures required to request evidence examinations and to package and ship evidence to the Laboratory
- **Examinations:** Describes the types of evidence examinations provided and specific evidence collection and preservation techniques
- **Crime Scene Safety:** Provides familiarity of the hazards, safety precautions, and safe work practices
- **Crime Scene Search:** Outlines the steps necessary to process a crime scene

The *Handbook* is available in three formats:

- Pocket-sized, paper format,
- CD-ROM format, and
- an online format on the FBI Internet site (**www.fbi.gov/programs/lab/handbook/intro.htm**) and on the FBI Intranet (**http://30.7.100.24/LabPubs.asp**)

Copies of the pocket-sized, paper format and the CD-ROM format were sent to all FBI field divisions and legal attachés.



Operations

USS Cole

On October 12, 2000, the USS Cole, a billion-dollar naval guided-missile destroyer, was heavily damaged in a terrorist attack in the port city of Aden, Yemen. The ship had stopped briefly for refueling before proceeding to the Persian Gulf to join the international fleet that polices United Nations sanctions against Iraq. In the attack, two suicide bombers in a small fiberglass boat blew a 40- by 40-foot hole in the side of the destroyer. The blast killed 17 American sailors and wounded 39.

Explosives Unit personnel (three examiners and two technicians), Evidence Response Team personnel, and Special Agent bomb technicians from several divisions were dispatched to Yemen to assist investigative teams from the New York and Washington Divisions. In addition to recovering a large volume of evidence from the ship and several search sites in Aden, the forensic team participated in the recovery of the remains of 12 sailors from damaged areas of the ship. The remains were sent to Dover Air Force Base, Delaware, where they were examined by four members of the FBI Disaster Squad. Two specialists from the Latent Print Unit also traveled to Yemen to provide guidance to Yemeni technicians in crime scene processing and comparing latent prints with suspects' inked prints.

DNA profiling was performed on numerous specimens recovered in the USS Cole investigation. These profiles were used to reveal additional suspects and any associations between human fragments found on the USS Cole and material recovered from search sites throughout Yemen.

Two Special Photographic Unit photographers accompanied the teams. Crime scene photographs assisted in identifying the victims and provided detailed photographic information regarding the impact of the explosion.

The Forensic Audio, Video, and Image Analysis Unit enhanced and authenticated two videotapes displaying scenes from Aden Harbor—one from equipment onboard the USS Cole and the other from the harbor-surveillance system.

Personnel from the Explosives Unit, Investigative Support Section, Special Photographic Unit, Special Agent Bomb Technicians, and New York and Jackson Divisions traveled to Ingalls Shipbuilding, Pascagoula, Mississippi, to examine the ship for additional evidence. These examinations were conducted in three trips during a three-month period as damaged areas of the ship were made safely accessible.

As of December 2000, more than 1,000 items of evidence from the USS Cole investigation were examined by personnel from 11 Laboratory units.

Dr. Donald M. Kerr, FBI Laboratory Director, conferred with FBI and U.S. Navy specialists aboard the USS Cole.

Dr. Dwight E. Adams (standing second from left), Laboratory Deputy Assistant Director, participated in the recovery of human remains at five sites during the Plaza Sweep operation.

Visual information specialists prepared crime scene reconstructions and digital terrain maps that depicted victim and evidence locations at two ranches.

The Crisis Response Unit provided video teleconferencing support, secure and non-secure voice and data communications, and real-time video teleconferencing between crime scenes, the El Paso Division, the Strategic Information Operations Center, and Mexican federal authorities in Mexico City.

In mid-September 2000, a federal grand jury indicted Vincente Carillo Fuentes, the alleged cartel leader, charging him with the murder of 10 people, including 7 whose remains were found in the mass graves.

Plaza Sweep

The El Paso Division, with the concurrence of the Mexican Government, requested Laboratory assistance in documenting suspected crime scenes and assisting in the search, recovery, and identification of human remains located at sites near Juarez, Chihuahua, Mexico, on the El Paso, Texas, border. On November 29, 1999, Mexican police and soldiers, accompanied by FBI forensic experts, began excavating sites they believed could hold the bodies of 100 to 200 Americans and Mexicans who disappeared in the past several years and were thought to have been killed by drug traffickers.

Two Special Photographic Unit photographers accompanied the Evidence Response Teams to photograph evidence recovered in the gravesite excavations. Approximately 10,000 photographs were produced, and more than 2,000 digital images were captured on-site for immediate use in forensic examinations, interviews, and briefings.

After weeks of digging, only nine bodies were recovered, including the remains of three Americans.

Bones and known blood samples from relatives of the missing people were submitted for mitochondrial DNA identification. This analysis, along with the information obtained from FBI Disaster Squad personnel, helped to identify seven of the nine bodies excavated from the mass gravesites.

Alaska Air Flight 261

On January 31, 2000, Alaska Air Flight 261, with 88 passengers and crew onboard, crashed into the Pacific Ocean northwest of the Los Angeles International Airport after reporting mechanical problems. The passengers had boarded the plane in Puerto Vallarta, Mexico, destined for San Francisco, California. All aboard the MD-83 perished. The U.S. National Transportation Safety Board revealed that a problem in the forward two-thirds of the horizontal stabilizer, the winglike section of the tail, caused the crash.

Four bodies and several hundred human remains were recovered in the search. Members of the FBI Disaster Squad examined the body parts and printed friction ridge areas. Twenty-four individuals were positively identified, including one identification of a child by footprints.

Osprey Crash

An MV-22 tilt-rotor Osprey aircraft, which takes off and lands like a helicopter, but flies like an airplane, crashed while landing at the Marana Northwest Regional Airport near Tucson, Arizona, on April 8, 2000, killing all 19 U.S. Marines onboard. The aircraft, involved in nighttime training exercises, was stationed at the U.S. Marine Corps air base in Yuma, Arizona.

FBI Disaster Squad personnel traveled to Dover Air Force Base, Dover, Delaware, to examine the bodies. Ten of the victims were positively identified by fingerprints.

An FBI Laboratory examiner shown measuring a skull excavated from an unmarked grave in Grenada.

Grenada

At the request of Grenada's Government, an eight-person Laboratory team was deployed to Grenada to assist in identifying the remains buried in U.S. military body bags found in unmarked graves at St. George's Cemetery. The government officials of Grenada wanted to determine if the bags contained the remains of Maurice Bishop, the former Prime Minister of Grenada, who was assassinated along with 18 members of his government, in the October 19, 1983, coup, which precipitated the U.S. military invasion and the American civilian evacuation of Grenada six days later.

Three gravesites were excavated, and two body bags were found. Examination of the remains revealed that the two body bags contained the partial remains of seven individuals, and the third gravesite contained the partial remains of an undetermined number of individuals. The mostly skeletal remains were processed for latent prints with negative results. Special Photographic Unit photographers produced approximately 1,000 images. On the basis of Laboratory examinations, all of the exhumed bodies were excluded as the body of Maurice Bishop.

EgyptAir Flight 990

On October 31, 1999, EgyptAir Flight 990 crashed into the Atlantic Ocean, 52 miles south of the Massachusetts island of Nantucket. All 217 people onboard were killed. The Boeing 767-300 crashed 33 minutes after departure from Kennedy International Airport in New York on a scheduled 11-hour nonstop flight to Cairo, Egypt. The airplane was apparently destroyed by impact force, and floating debris from the aircraft was recovered on the morning of the crash. On November 1, 1999, the Boston Division requested technical assistance from the Laboratory to identify the passengers and crew and to assist with the salvage and recovery of the aircraft.

The Crisis Response Unit was deployed to Providence, Rhode Island, on November 2, 1999. Unit personnel supported the Flight 990 recovery efforts by establishing command posts that provided secure voice, text, imagery capabilities, and video teleconferencing. Two command posts were also outfitted with a mobile KU-Band Satellite system that provided e-mail and high-speed, secure, video teleconferencing.

Thousands of body parts were examined by FBI Disaster Squad personnel. Identifiable fingerprints, palm prints, and footprints were obtained from 38 body parts, but only one victim was identified. Approximately 1,200 samples from the remains were sent to the Armed Forces Institute of Pathology for possible DNA analysis.

Boston evidence response personnel recovering and salvaging the aircraft.

Sacred Ibis

The arrest of Russian diplomat Stanislav Borisovich Gusev on December 8, 1999, in Washington, DC, was the culmination of an intensive six-month investigation, code-named Sacred Ibis, by the Washington Field Division.

The Laboratory provided technical support that resulted in the FBI's first successful recovery of a complete covert radio-frequency collection system. The Russian-controlled collection system consisted of a microphone transmitter, disguised as a section of wooden chair rail installed in the conference room, and the remote-control equipment used to clandestinely operate the radio-frequency collection system from outside the U.S. Department of State's main building.

Latent print specialists processed the conference room and Gusev's vehicle, which contained a recording device used to capture audio from the conference room. More than 30 latent prints were developed. Prints from the vehicle were identified as the fingerprints of Gusev.

Special Events

World Trade Organization

Seattle, Washington, hosted the largest free-trade meeting ever held in the United States from November 30 to December 3, 1999. The World Trade Organization meeting, held to negotiate politically sensitive worldwide issues including rules on agriculture and new technologies, was attended by 5,000 delegates and dignitaries from 134 nations. Protestors from 300 groups caused more than $15 million in damage.

In cooperation with the Seattle Police Department, the Seattle Mayor's Office, the U.S. Secret Service, and others, the Crisis Response Unit provided secure communications support, the Hazardous Materials Response Unit provided a full-response capability, and the Bomb Data Center deployed bomb technicians and specialized equipment to enhance improvised explosive device disposal capability.

Democratic and Republican National Conventions

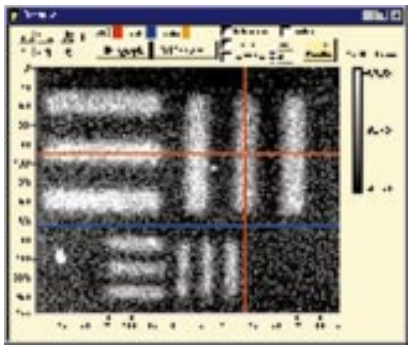
From July 31 to August 2, 2000, Philadelphia, Pennsylvania, hosted the Republican National Convention. The Democratic National Convention was held in Los Angeles, California, on August 14–17, 2000. In anticipation of potential terrorists targeting the conventions, Laboratory personnel assembled locally based emergency-strike teams with the capability of coordinating a multiagency response to bombings and biochemical attacks. The Crisis Response Unit provided 24-hour communications, the Physical Surveillance Unit provided electronic-tracking equipment and technical expertise, and the Hazardous Materials Response Unit provided a full-response capability. In addition, the Bomb Data Center provided Special Agent bomb technicians, robots, and specialized bomb-response gear.

Research and Development

The Laboratory provides technical leadership for the FBI and state and local law enforcement agencies by developing and validating new forensic technologies and techniques by internal and contracted research.

Active Thermography for Serial Number Restoration

The first of its kind, an active thermography system was designed to aid in visualizing obliterated serial numbers. Current serial number recovery techniques require a lengthy chemical procedure. The new system uses a series of pulsed flash lamps to precisely heat a metal surface. As the metal cools, a high spatial and temporal resolution thermal camera photographs the cooling metal. A series of these heating and cooling cycles is arranged in a specific pattern. Image analysis tools are then used to reconstruct the serial number image. The system is being validated.



Thermographic image of metal with milled slots in the back.

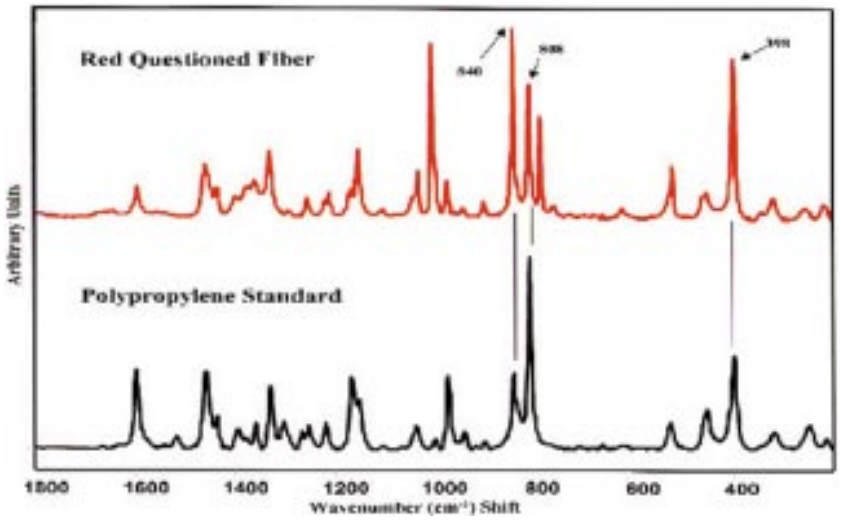
Analysis of Inorganic Poisons

Capillary electrophoresis analysis methods are being developed to screen for inorganic poisons in food and human biological samples. Several tests are used to detect adulteration in food or toxicology samples, but a single test is being sought for poisons like cyanide, arsenic, and azide. A more efficient test will result in faster identification of poisons and require less sample. This permits analyzing samples with more definitive tests or eliminating unnecessary tests.

Development of Raman Spectrometry

The Hazardous Materials Response Unit sponsors extramural research and development projects on Raman spectrometry for the identification of chemical compounds in field investigations. Raman spectrometry, named after the Indian physicist C. V. Raman, who discovered the effect in 1928, is based on the unique patterns of emissions (spectra) produced by different chemical compounds when they are excited by light. Recent developments in laser and optical technologies have made it practical to use Raman spectrometry safely and nondestructively to identify questioned chemical compounds contained in transparent containers or found on surfaces. The Pacific Northwest National Laboratory in Richland, Washington, recently developed a database containing Raman spectra for a large number of toxic and explosive chemicals. The Oak Ridge National Laboratory in Oak Ridge, Tennessee, is developing a unique self-contained Raman spectrometer designed for use in investigations when hazardous materials are suspected. These development projects will significantly enhance the Laboratory's capability for identifying hazardous chemicals in the field.

Self-contained portable Raman spectrometer developed by Oak Ridge National Laboratory.



Raman spectrum of the red fiber compared to an undyed polypropylene fiber spectrum.

Raman Analysis of Single Fibers

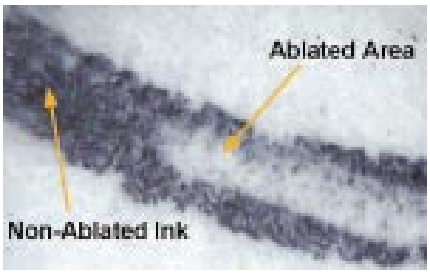
Infrared spectroscopy is the current forensic method used to identify fiber polymer composition to the subgeneric class level. A disadvantage of infrared analysis is that it requires removing the fiber from the glass microscope slide after examination by visual light microscopy. Raman spectroscopy of fibers can circumvent this inherent disadvantage, and Raman spectroscopy provides information that is similar and complimentary to that of infrared analysis. Raman spectra include dye information but can interfere with the polymer spectra. The project has yielded successful results for certain fiber types to subcategorize the generic class, but not with all types. Laboratory personnel working on this project are continuing to investigate how dye spectral contributions can aid analysis by providing additional fiber characterization during forensic examination.

X-Ray Spectral Database

The X-ray spectral database was designed to assist scanning electron microscopists identify and classify evidentiary items. The spectral library identification and classification engine permits collecting, analyzing, and searching descriptive (textual) information, digital images, and X-ray spectra. The system currently contains more than 1,000 sets of data. The new system has been used in casework to help identify an unusual ammunition primer on a murder suspect's clothing, drywall material from under the fingernails of a suspect, and a metal-polishing compound recovered from a murder victim. In these cases, scanning electron microscopy results provided valuable investigative leads.

Use of Laser Ablation for the Elemental Characterization of Materials

The concentrations of elements in a variety of materials recovered as evidence have been used with great success in criminal investigations. In some instances, limited sample sizes or court limitations placed on the destruction of evidence have made it difficult to obtain analytical results with the precision and accuracy required for good discrimination among potential sources. The results of a research study have shown that an ultraviolet laser can be used to ablate material into the vapor phase, a form which can be analyzed for elemental content using either a mass or emission spectrometer. One advantage of this approach is that the laser beam size and power can be controlled to ensure that the analytical procedure is destructive to only a portion of an evidentiary particle or other small item. For example, in the image shown, a ballpoint pen stroke has been removed from a document with minimal damage to the underlying paper fibers or the overall appearance of the inked writing on the document. Black inks from different ballpoint pens of the same manufacturer and type can be differentiated by their elemental compositions using laser ablation–inductively coupled plasma–mass spectrometry (LA–ICP–MS). Methods have been developed for LA–ICP–MS analysis of a variety of evidentiary materials, including hair, inks, toners, polymers, paints, glass, and metal alloys.



Analysis of Mitochondrial DNA in Dogs and Cats

Currently, animal hair submitted as forensic evidence is evaluated using conventional microscopy. These experientially based examinations could potentially be supplemented and reinforced by mitochondrial DNA (mtDNA) analysis. The Laboratory routinely analyzes mtDNA from human hairs and other tissues, and the same technology could be applied to other species such as cat and dog. Previous work has demonstrated the potential informativeness of cat and dog mtDNA analysis. In fact, in some criminal cases, identification of the animal source through DNA analysis of cat and dog hair has provided an important link between the perpetrator (or victim) and the crime. A typing method for dog and cat mtDNA analysis, as well as the necessary databases, are being developed and validated by Forensic Science Research Unit personnel for forensic casework.

Evaluation of High-Throughput STR Systems

Forensic laboratories nationwide submit DNA profiles to the FBI's Combined DNA Index System (CODIS) to compare profiles from forensic evidence and convicted offenders. The FBI was recently granted the authority to establish a database of DNA profiles from federal convicted offenders to be integrated into CODIS. In order to meet the demands of the database, a high-throughput DNA analysis system is essential. New kits that enable typing of the 13 DNA markers [short tandem repeat (STR) loci] in a single-reaction format were evaluated and validated for offender database usage. These kits offer the benefits of reduced reagent consumption, cost, and labor. The kits will enable the forensic community to reduce the sizable backlog of offender samples and casework samples nationwide and will enhance the ability of forensic laboratories to provide critical investigative leads through CODIS.

Extraction of DNA From Bone

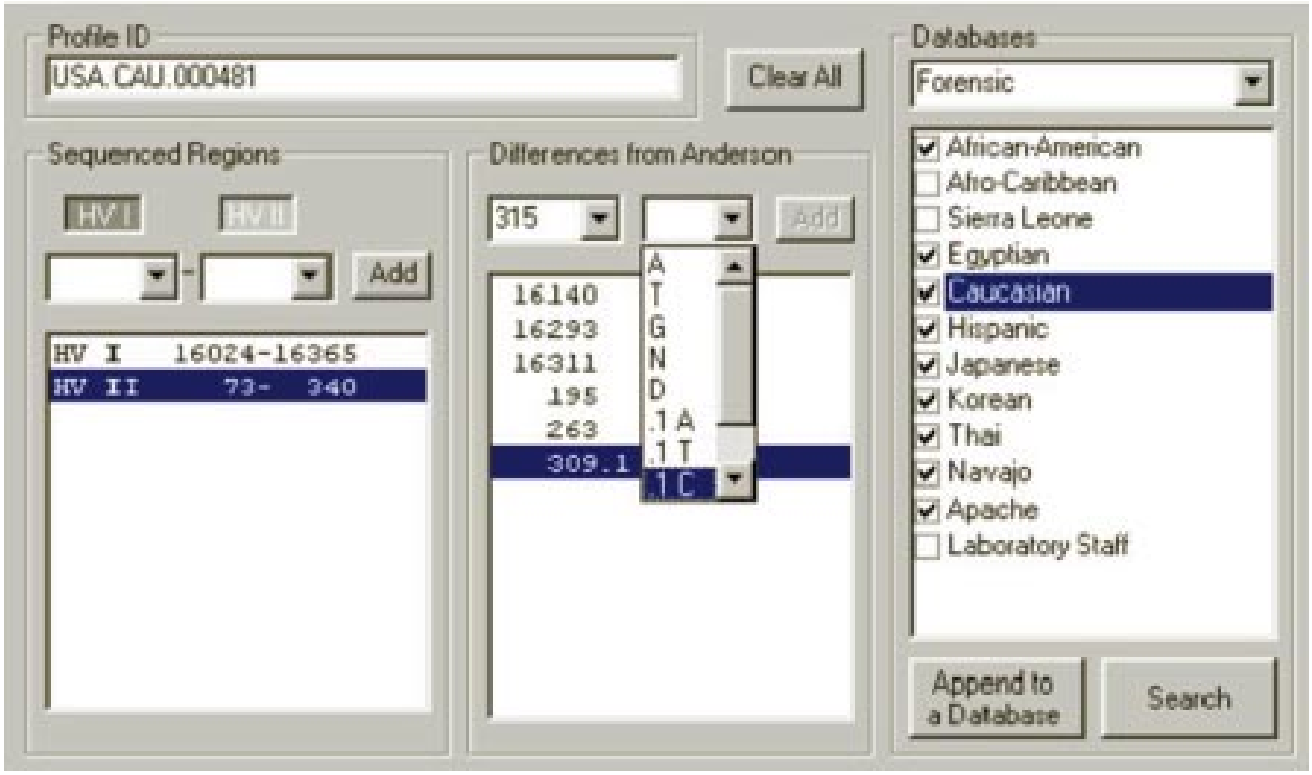
Cases involving missing persons and mass disasters can require DNA analysis of skeletal remains. These bone samples can be challenging forensic samples because of the low levels of DNA that are present, the likelihood of DNA degradation, and the potential presence of PCR inhibitors. The Laboratory is improving the mitochondrial DNA (mtDNA) extraction protocol to increase successful mtDNA typing from bones. Research to modify the existing protocol and develop extraction and purification strategies for efficiently obtaining highly purified DNA from bone has been performed.

Example of skeletal remains to be analyzed for mtDNA.

CODIS Mitochondrial DNA Database

A mitochondrial DNA database system, jointly developed by Forensic Science Research Unit and DNA Analysis Unit II personnel, was successfully integrated into the Combined DNA Index System (CODIS). Characterization of forensic specimens by analysis of mitochondrial DNA (mtDNA) has gained wide acceptance in courts of law. Mitochondrial DNA analysis is particularly valuable for specimens that are too highly degraded or otherwise do not lend themselves to successful nuclear DNA analysis. The strength of a forensic match is conveyed by reporting the number of times the casework profile is observed in one or more datasets of unrelated individuals.

The additional fact that mtDNA is inherited solely through maternal lineage makes it especially useful in missing persons cases. Thus, across the CODIS network, the system provides the capability to store and search databases of mtDNA profiles of missing persons, unidentified remains, and living persons seeking a missing family member.



The CODIS database screen allowing entry of a forensic mitochondrial DNA profile and specification of the datasets of unrelated individuals to be searched.

Training

The FBI Laboratory provides training to FBI personnel and to national and international law enforcement agency personnel and forensic scientists. The training ranges from basic crime scene processing to specialized forensic science courses, some of which are not available anywhere else in the world.

These specialized forensic classes are conducted at the FBI Academy in Quantico, Virginia; the Hazardous Devices School in Huntsville, Alabama; and at local and regional host sites.

During 2000, the FBI provided instruction to more than 15,000 students. Changes implemented in 1999 significantly expanded the reach of the FBI Specialized Forensic Science Training Program. In 1999, only 490 students received training in 27 schools, whereas in 2000 the program provided training to 785 students in 44 schools.

The FBI Laboratory also coordinates and sponsors international symposia to facilitate the exchange of technical and scientific information and research on topics of importance to the forensic community. In 2000, the *28th Annual Crime Laboratory Development International Symposium* was held in Buffalo, New York.

Virtual Academy

The FBI is establishing a Virtual Academy, which will automate student registration and tracking and offer an online resource and training center. A new series of courses that provide the fundamentals of a discipline are being developed and will be offered through the Virtual Academy, including the following:

- Fundamentals of Bloodstain Pattern Analysis
- Fundamentals of Forensic Biology
- Fundamentals of Forensic Chemistry
- Fundamentals of Friction Ridge Examinations
- Fundamentals of Forensic Videography

These courses are designed to provide front-end training to help make classroom training more effective. When applicable, students will be required to successfully complete a distance learning examination prior to qualifying for classroom training.

Hazardous Devices School

The Hazardous Devices School was created in 1972 and is located at the Redstone Arsenal in Huntsville, Alabama. It is funded by the FBI and operated by the U.S. Department of the Army. The Hazardous Devices School provides basic training for all public safety bomb technicians in the United States and offers the only training recognized by the National Bomb Squad Commander's Advisory Board, which sets certification standards for bomb technicians and accreditation standards for bomb squads.

The Hazardous Devices School offers the following courses for public safety personnel:

- **Basic Course.** Provides the foundation of training for public safety bomb technicians
- **Recertification Course.** Tests and updates skills for public safety bomb technicians who are required to attend every three years
- **Robotics Course.** Trains bomb technicians in the effective deployment of robotics during render-safe operations
- **Executive Management.** Familiarizes public safety bomb squad managers with bomb squad duties, capabilities, and equipment and the resources required to operate a bomb squad

Distance Learning

In addition to traditional classroom training, more than 500 students received training through the distance learning program established as part of the ongoing effort to expand training. New CD-ROM-based courses completed and offered during 2000 include the following:

- Basic Crime Scene Management
- Friction Ridge Examiner Training
- Technically Trained Agents Jeopardy
- Forensic Evidence in Child Abuse Cases

Training Offered	Sessions	Students
FBI Inservice	10	263
FBI New Agent Forensic Training	9	284
FBI National Academy Forensic Training	4	1,063
Specialized Forensic Science Training	44	785
Bomb Technician Seminars/Courses	18	401
Computer Analysis Response Training	10	90
Electronics Technician Training	56	683
Evidence Program Training	13	600
Evidence Response Team Inservice	94	802
Hazardous Devices Schools	75	1,205
Hazardous Materials Response Training	33	787
Latent Print Seminars	10	800
Latent Print Training	40	850
Photography Training	2	20
Post Blast Investigations Training	7	245
Technically Trained Agent Training	59	654
X-Ray Training for Security Operations	4	147
Seminars and Conferences	4	179
Scientific Working Group Meetings	12	364
International Symposia	1	271

FORENSIC SCIENCE COMMUNICATIONS

Forensic Science Communications (FSC) is a forensic science journal published quarterly on the Internet by FBI Laboratory personnel. This journal is a means of communication between forensic scientists, permitting information of value and interest to be rapidly disseminated among scientists and other interested persons.

Submissions to ***Forensic Science Communications*** may include letters to the editor, review articles, research papers or feature articles, technical articles, book reviews, and technical notes or case reports.

Manuscripts and other information relating to the journal should be sent to:

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